CPR Force Sensitive Resistor Sensor Specification

1. Product Overview

- CPR-FS01 is a high-precision, ultra-thin sensor based on advanced Force Sensitive Resistor (FSR) film technology. it is specifically designed for Cardiopulmonary Resuscitation (CPR) quality monitoring and feedback systems.
- This sensor can convert the compression force applied to the chest into real-time, Accurate chest compression depth data, Providing reliable raw input for core algorithms.
- The sensor features a lightweight, flexible, And thin design for easy integration、 Into CPR manikins, compression pads, Or handheld feedback devices, and advanced life support equipment, effectively reducing errors in compression depth and rate caused by human judgment during emergencies, Thereby increasing the proportion of high-quality CPR delivered.

ISO13485

ISO9001

IATF 16949

2. Core Technical Features

- Sensing Principle: High-sensitivity Force Sensitive Resistor (FSR); Resistance decreases non-linearly with increasing applied force.
- Structure: Ultra-thin polymer thick-film structure with excellent flexibility and durability.
- Output: Analog resistive signal output; requires an external signal conditioning circuit (e.g., voltage divider, operational amplifier) for conversion to a standard voltage/current signal.
- Integration-Friendly: Provides standard pin interfaces and an adhesive backing layer, Supporting quick installation and integration.

3. Key Performance Parameters

3.1 Chest Compression Depth Sensing Performance

The sensor's force signal, after system calibration and algorithm processing, shall meet the following performance indicators related to compression depth, referencing standards from mainstream medical device manufacturers:

- Sensing Range: Corresponds to a compression depth of 1.5 cm to 8.0 cm.
- Effective Range: Corresponds to a compression depth of 1.5 cm to 8.0 cm.
- Accuracy: Within the effective range, accuracy is ±0.5 cm or ±10% (whichever is greater).
- Resolution: 0.1 cm.
- Target Operating Range: According to emergency guidelines, the sensor should accurately monitor the recommended adult compression depth of 5-6 cm.

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3.2 Compression Rate and Recoil Sensing Performance

The following parameters can be calculated from the dynamic force signal output by the sensor:

- Rate Range: Capable of monitoring compression rates from 40 to 160 compressions per minute (cpm).
- Target Rate: Corresponds to the guideline-recommended 100-120 compressions per minute .
- Recoil Detection: The sensor can detect when compression force is fully released to a near-zero state, Used to determine whether full chest recoil is achieved, ensuring adequate cardiac pre-filling.

3.3 Electrical Characteristics

The following are the core electrical parameters of the sensor, with some referencing typical values of similar FSR products:

- Initial Resistance (No Load): >10 MΩ.
- Full-Scale Resistance: Can drop to <10 kΩ when maximum force is applied.
- Response Time: <5 ms, ensuring capture of the dynamic process of rapid CPR compressions.
- Repeatability: <±3.0% (Full Scale).
- Power Consumption: Extremely low static power consumption; typical operating current <0.5 mA.

3.4 Mechanical & Environmental Specifications

Physical Specifications:

- Active Sensing Area: Diameter 12.7 mm (standard circular).
- Overall Thickness: < 0.3 mm.
- Lead Wires: Standard two-core shielded cable, length 100 cm (customizable per customer requirements).
- Connector: Optional standard 3-pin connector (e.g., JST) for easy connection/disconnection.

Operating Conditions:

- Operating Temperature: 0°C to +50°C.
- Operating Humidity: 10% to 95%, non-condensing.
- Storage Temperature: -30°C to +70°C.

4. Reliability, Lifetime & Compliance

4.1 Mechanical Lifetime

- Under conditions simulating standard CPR compressions (depth 5-6 cm, rate 110 cpm), The sensor can withstand >100,000 continuous compression cycles with performance degradation not exceeding 10% of the initial value.

4.2 Regulatory & Standard Compliance (Guidance for Final Device Integration)

As a component for medical electrical equipment, this sensor is designed to assist customers (device manufacturers) in meeting the following primary international and regional regulatory requirements. After integrating this sensor into the final device, customers must perform whole-device certification:

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4.2 Regulatory & Standard Compliance (Guidance for Final Device Integration)

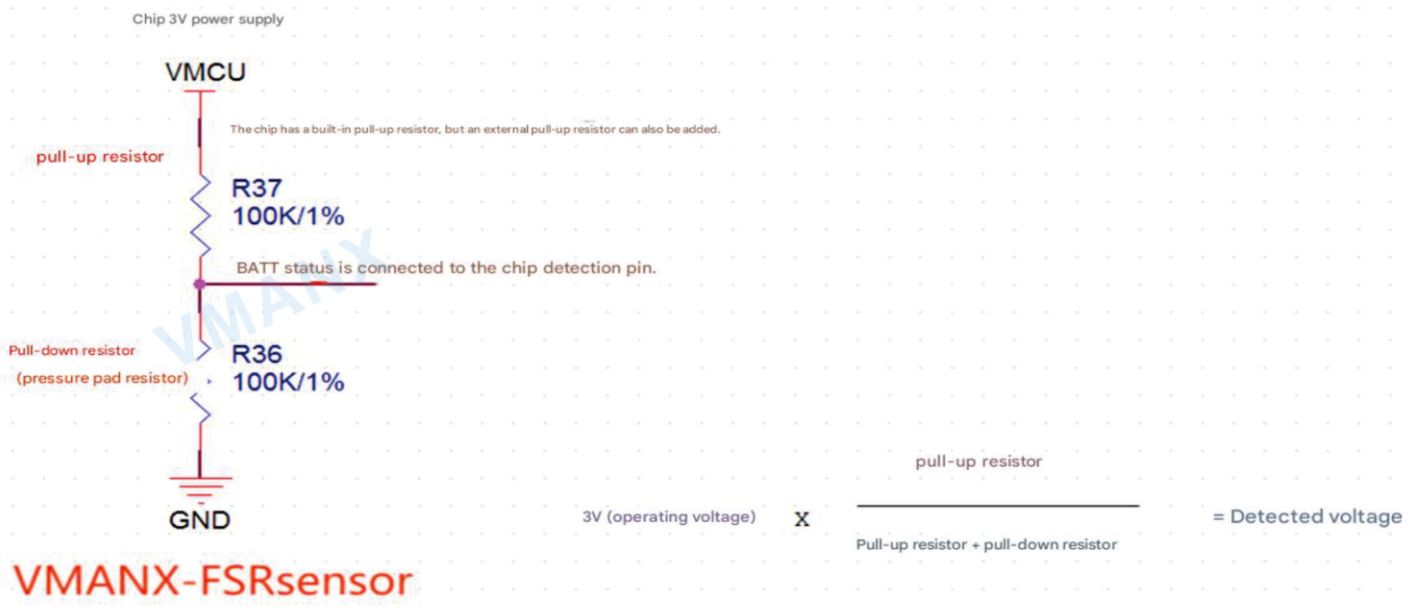
- Electrical Safety: IEC 60601-1 / EN 60601-1
  (General requirements for basic safety and essential performance of medical electrical equipment).
- Electromagnetic Compatibility (EMC): IEC 60601-1-2 / YY 0505-2012
  (Requirements and tests for EMC of medical electrical equipment).
- Environmental Testing: It is recommended that the final device be tested per climate environment Group II and mechanical environment Group II requirements in standards such as GB/T 14710 or Equivalent (e.g., IEC 60068-2 series), including high/low temperature, damp heat, vibration, impact, And transportation tests.
- RoHS: The product complies with EU RoHS Directive 2011/65/EU and its amendments, Restricting the use of hazardous substances.

5. Integration & Application Guidance

5.1 Typical Application Circuit

- The sensor requires an external simple signal conditioning circuit.
- Using a series load resistor (RL) to convert the sensor's resistance change into a voltage output (Vout) is recommended.
- The value of RL (typically between 10 kΩ and 100 kΩ) should be optimized based on the customer's system-specific force-to-voltage conversion relationship, ADC range, and desired sensitivity.

(Circuit diagram placeholder)



5.2 Calibration & Data Utilization

- System Calibration: Customers must establish a calibration curve from the sensor's output voltage (Vout) to compression force (N), and then to compression depth (cm) within their final product. This typically requires using a standard force testing device at multiple calibration points (e.g., forces corresponding to depths of 1.5, 3.0, 5.0, 6.0, 8.0 cm).
- Algorithm Processing: The raw force signal requires software algorithms to calculate real-time compression rate, detect compression interruptions (pressure below a threshold for longer than a set duration, e.g., 1.5 seconds), and determine chest recoil (pressure dropping to near-zero).
- Data Refresh Rate: To ensure real-time performance, the overall system refresh rate for sensor signal sampling and algorithm processing should be no less than 0.5 Hz.

6. Packaging, Ordering & Support

- Packaging: Each sensor is individually packed in an anti-static bag; 50 pieces per box.
- Ordering Part Number: VMANX-CPR-FS01.
- Technical Support: Preliminary application notes, reference circuit designs, and technical consultation services are provided to assist customers with product integration and debugging.

7. Product Application Diagram

Pb-free
RoHS COMPLIANT
REACH
CE

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